

63.91
**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP 02/02788

- 3.3 The subject-matter of claim 1 therefore is new and satisfies the criteria set forth in Article 33(2) PCT.
- 3.4 The subject-matter of claim 12, for so far as it can be understood (see clarity objection above), is not anticipated by D1. In fact, claim 12 concerns the method of using the device of claim 1 (or any of the other dependent claims). For this reason, the subject-matter of claim 12 is new and satisfies the criteria set forth in Article 33(2) PCT.
- 3.5 The subject-matter of claims 2-11 is likewise new and satisfies the criteria set forth in Article 33(2) PCT.

4. INVENTIVE STEP

- 4.1 The problem to be solved by the present invention may be regarded as to quickly and accurately positioning the measuring head on the pipe under test.
- 4.2 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:
the device in D1 requires the operator to go through the lengthy preparatory process of opening the anvil (42a, 42b), introducing the pipe into the open space and finally closing the anvil. The solution put forward by the applicant consists in having rotatable members and detector forming an angle smaller than 180°, so that the measuring head (comprising the rotatable members and the detector itself) can simply and directly be placed onto the pipe to be tested.
- 4.3 This solution is not anticipated by any of the documents in the search report. In particular, document D2 employs a similar "closed anvil" configuration as D1.
- 4.4 Claims 2-11 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to inventive step.

5. INDUSTRIAL APPLICABILITY

The subject-matter of the claims is considered to be industrial applicable and these claims therefore fulfill the requirements of Article 33(4) PCT.

10/507493

DT04 Rec'd PCT/PTO 13 SEP 2004

11

Claims

1. An apparatus for measuring deformation of a surface of a pipe comprising a detector capable of directly
5 detecting changes in the radius of a pipe and a plurality of guides for guiding the detector along the pipe in a direction parallel to the longitudinal axis of the pipe, the guides comprising rotatable members spaced apart from the detector and arranged to contact a
10 surface of the pipe when the detector is in contact with the pipe, wherein a said guide is provided on each side of the detector, the rotatable members of the guides and the detector being positioned substantially along an arc, and the distance between each said rotatable member
15 of the guide and the detector being smaller than the radius of the arc, whereby an output related to the deformation of the pipe surface is derived from the output of the detector.
- 20 2. An apparatus as claimed in claim 1, wherein the detector is arranged to measure the distance between a region of the pipe adjacent the detector and a part of the apparatus.
- 25 3. An apparatus as claimed in claim 2, wherein the detector is arranged to be placed in contact with the surface of the pipe and is moveable in the radial direction of the pipe such that the deformation of the pipe surface may be determined from the displacement of
30 the detector.
4. An apparatus as claimed in claim 1, 2 or 3, wherein the guide(s) comprise magnet(s) arranged to hold the apparatus in position against a steel pipe.
- 35 5. An apparatus as claimed in any preceding claim, wherein the detector comprises a rotatable member that is arranged to roll over

the surface of the pipe.

6. An apparatus as claimed in claim 5, wherein the rotatable member of the detector is movably mounted on a housing and each guide member is mounted on an arm extending laterally from the housing.

7. An apparatus as claimed in claim 5 or 6 comprising measurement means for measuring the displacement of the rotatable member of the detector in relation to the housing.

8. An apparatus as claimed in any preceding claim wherein said apparatus further comprises transporting means to transport the detector means along the pipe.

9. An apparatus as claimed in any preceding claim, arranged to measure the distance traveled by the apparatus along the pipe.

10. An apparatus as claimed in claim 9, wherein the distance traveled is determined by measuring the number of rotations of a rotatable member engaged with the pipe.

11. An apparatus for detecting deformation of a surface of a pipe comprising:

(i) a detector capable of detecting changes in the radius of a pipe when placed in contact with the surface of the pipe, said detector means being moveable in the radial direction of the pipe at the point of contact;

(ii) a guide assembly capable of guiding the detector along the surface of the pipe in a direction parallel with the longitudinal axis of the pipe, wherein the guide assembly comprises rotatable members provided on each side of the detector being positioned substantially along an arc, the distance between each

said rotatable member of the guide and the detector being smaller than the radius of the arc; and

(iii) measurement means capable of measuring the radial displacement of the detector, whereby to produce
5 an output related to the deformation of the pipe surface.

12. A method of measuring the deformation of surface of a pipe using the apparatus as claimed in any preceding
10 claim.